

We claim:

1. A method of searching for multipath components of a CDMA signal, the method comprising:

for each of a plurality of correlation periods which  
5 are not entirely contiguous, for each of a plurality of  
multipath delays within a search window, determining a  
corresponding coherent correlation between a portion of the  
CDMA signal received during the correlation period and a  
corresponding portion of a known code offset by the multipath  
10 delay;

combining non-coherently the coherent correlations  
determined for each multipath delay into a search statistic for  
that multipath delay.

2. A method according to claim 1 wherein consecutive  
15 ones of the plurality of correlation periods are each separated  
by a respective non-zero time interval.

3. A method according to claim 2 wherein the correlation  
periods are uniformly spaced.

4. A method according to claim 1 further comprising:

20 defining a plurality of search task periods with  
reference to a system time during a search period;

for each of the plurality of correlation periods,  
selecting a corresponding search task period during which to  
determine the corresponding correlations.

25 5. A method according to claim 4 further comprising:

for each correlation period, if the correlation  
period is earlier by a delay period than the corresponding  
search task period, buffering the portion of the CDMA signal

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received during the correlation period at least as long as the delay period.

6. The method of claim 1 wherein performing a correlation comprises:

5 multiplying the CDMA signal received during a correlation period by the corresponding portion of the known code and by an orthogonal code which removes all components of the received signal except a pilot channel component.

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10 7. The method of claim 4 wherein the CDMA signal comprises a pilot channel having pilot channel slots and power control slots defined with reference to a mobile unit time, mobile unit time being system time delayed by a round trip delay to the mobile unit, the method further comprising:

15 selecting the search task periods corresponding with the correlation periods such that the search task periods do not overlap partially with any of the power control slots, and setting the correlation periods to equal the search task periods.

20 8. A method according to claim 4 wherein the CDMA signal comprises a pilot channel having pilot channel slots and power control slots defined with reference to a mobile unit time, mobile unit time being system time delayed by a round trip delay to the mobile unit, wherein the search task period is of the same duration as a power control slot, the method further  
25 comprising:

for each search task period of the plurality of search task periods:

if the search task period does not overlap partially with any power control slot, setting the corresponding  
30 correlation period to equal the search task period;

if the search task period overlaps with an end portion of a power control slot, setting the corresponding correlation period to equal a period during which the power control slot is received; and

- 5           if the search task period overlaps with a start portion of a power control slot, setting the corresponding correlation period to equal a period preceding a period during which this power control slot is received.

9.           A method according to claim 4 wherein the CDMA signal  
10 comprises a pilot channel having pilot channel slots and power control slots defined with reference to a mobile unit time, mobile unit time being system time delayed by a round trip delay to the mobile unit, wherein the search task period has a different duration than a power control slot, the method  
15 further comprising:

selecting the search task periods corresponding with the correlation periods such that the search task periods do not overlap with an end portion of any power control slot;

- if the search task period does not overlap partially  
20 with any power control slot, setting the corresponding correlation period to equal the search task period;

- if the search task period does overlaps with a start portion of any power control slot, setting the corresponding correlation period to equal a period preceding the start of the  
25 power control slot.

10.          A method according to claim 7 further comprising:

selecting the search task periods corresponding with the correlation periods such that the search task periods do not overlap at all with any of the power control slots.

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11. A method according to claim 4 further comprising:

grouping search task periods into power control groups of N consecutive search task periods each, where  $N \geq 2$ ;

5 selecting the plurality of search task periods to include at most one search task period from each power control group.

12. A method according to claim 4 further comprising:

grouping the search task periods into groups of N consecutive search task periods each, where  $N \geq 2$ ;

10 selecting the search task periods corresponding with the correlation periods to consist of an Mth search task period in every power control group, where  $1 \leq M \leq N$ .

13. A method of searching within a received signal for multipath components received from a plurality of mobile units,  
15 the method comprising:

for each mobile unit:

for each of a respective plurality of correlation periods which are not entirely contiguous, for each of a plurality of multipath delays within a search window, determining a  
20 corresponding coherent correlation between a portion of the CDMA signal received during the correlation period and a portion of a respective known code for the mobile unit offset by the multipath delay;

25 combining non-coherently the coherent correlations determined for each multipath delay into a search statistic for that multipath delay for that mobile unit.

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14. A method according to claim 13 wherein for each mobile unit, consecutive ones of the respective plurality of correlation periods are each separated by a respective non-zero time interval.

5 15. A method according to claim 13 wherein for each mobile unit, the respective plurality of correlation periods are uniformly spaced.

16. A method according to claim 14 further comprising:

10 defining a plurality of search task periods with reference to a system time during a search period;

for each mobile unit, for each correlation period the respective plurality of correlation periods, selecting a corresponding search task period during which to determine the corresponding correlations.

15 17. A method according to claim 16 further comprising:

for each mobile unit, for each correlation period of the respective plurality of correlation periods, if the correlation period is earlier by a respective delay period than the corresponding search task period, buffering the CDMA signal  
20 received during the correlation period at least as long as the respective delay period.

18. The method of claim 17 wherein for each mobile unit, each multipath component comprises a pilot channel having pilot channel slots and power control slots defined with reference to  
25 a respective mobile unit time, mobile unit time being system time delayed by a respective round trip delay to the mobile unit, the method further comprising:

for each mobile unit selecting the corresponding search task periods such that the search task periods do not

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overlap partially with any of the power control slots of that mobile unit, and setting the correlation periods to equal the search task periods.

19. A method according to claim 17 wherein for each  
5 mobile unit, each multipath component comprises a pilot channel having pilot channel slots and power control slots defined with reference to a respective mobile unit time, mobile unit time being system time delayed by a round trip delay to the mobile unit, wherein the search task period is of the same duration as  
10 a power control slot, the method further comprising for each mobile unit:

for each search task period of the corresponding search task periods for the mobile unit:

if the search task period does not overlap partially  
15 with any power control slot of that mobile unit, setting the corresponding correlation period to equal the search task period;

if the search task period overlaps with an end  
portion of a power control slot of that mobile unit, setting  
20 the corresponding correlation period to equal the period during which the power control slot is received; and

if the search task period overlaps with a start  
portion of a power control slot of that mobile unit, setting  
the corresponding correlation period to equal a period  
25 preceding the power control slot.

20. A method according to claim 17 wherein for each  
mobile unit the respective multipath components comprises a  
pilot channel having pilot channel slots and power control  
slots defined with reference to a respective mobile unit time,  
30 mobile unit time being system time delayed by a round trip

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delay to the mobile unit, wherein the search task period has a different duration than a power control slot, the method further comprising for each mobile unit:

selecting the corresponding search task periods such  
5 that they do not overlap with an end portion of any power control slot of the mobile unit;

if the search task period does not overlap partially with any power control slot of the mobile unit, setting the corresponding correlation period to equal the search task  
10 period;

if the search task period does overlap with a start portion of any power control slot of the mobile unit, setting the corresponding correlation period to equal a period preceding the start of the power control slot.

15 21. A method according to claim 17 further comprising:

for each mobile unit, selecting the corresponding search task periods such that the search task periods do not overlap at all with any of the power control slots of the mobile unit.

20 22. A method according to claim 17 further comprising:

grouping search task periods into power control groups of N consecutive search task periods each, where  $N \geq 2$ ;

for each mobile unit, selecting the corresponding search task periods to include at most one search task period  
25 from each power control group.

23. A method according to claim 17 further comprising:

grouping the search task periods into groups of N consecutive search task periods each, where  $N \geq 2$ ; and

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for each mobile unit selecting corresponding search task periods to consist of the Mth search task period in every power control group, where  $1 \leq M \leq N$ .

24. A method according to claim 23 further comprising:

5 allowing a maximum of Q correlations to be determined during each group of Mth search task periods,  $Q \geq 1$ , and selecting the search task periods for mobile units accordingly.

25. A method according to claim 24 further comprising:

maintaining a count of how many correlations are to  
10 be determined during each search task period;

scheduling a new search by selecting the Mth search task periods with a minimum number of correlations to be determined.

26. A method according to claim 24 further comprising:

15 avoiding scheduling correlations for a mobile unit during correlation periods during which the mobile unit's pilot channel is gated off.

27. A searcher adapted to implement a method according to claim 1.

20 28. A searcher adapted to implement a method according to claim 1.

29. A base station adapted to implement a method according to claim 1.

30. A base station adapted to implement a method  
25 according to claim 1.

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31. A computer readable medium having stored thereon instructions for causing a computing platform to execute a method according to claim 1.

32. A computer readable medium having stored thereon  
5 instructions for causing a computing platform to execute a method according to claim 1.

33. A searcher comprising:

a search engine capable of performing Q search tasks during each of a plurality of search task periods defined in  
10 local time, where  $Q \geq 1$ ;

a scheduler adapted to schedule a search process for each of a plurality of known codes by selecting a respective plurality of search task periods during which the search engine is to execute a search task as part of the search process in a  
15 manner such that no more than Q search tasks are scheduled for any search task period.

34. A searcher according to claim 33 further comprising:

a counter for each search task period maintained by the scheduler identifying how many search tasks have been  
20 scheduled for the search task period;

wherein the scheduler is adapted to schedule a new search process by selecting search task periods having fewer search tasks scheduled.

35. A searcher according to claim 33 wherein:

25 the search task periods are grouped into power control groups of N consecutive search task periods each, and wherein the scheduler is adapted to schedule a search process

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by selecting an Mth search task period of a plurality of the power control groups, where  $1 \leq M \leq N$ .

36. A searcher according to claim 35 further comprising:

5 a counter for each value of M identifying how many search tasks have been scheduled for the Mth search task period of a plurality of power control groups;

10 wherein the scheduler is adapted to schedule a new search process by selecting the Mth search task periods having fewest number of search tasks scheduled as indicated by the counters for the values of M.

37. A searcher according to claim 36 wherein:

15 the search engine is adapted to execute each search task by for each of a plurality of multipath delays within a search window determining a corresponding coherent correlation between a portion of the CDMA signal received during the correlation period and a corresponding portion of a known code offset by the multipath delay;

20 after executing all of the search tasks for a given search process, the search engine is adapted to combine non-coherently the coherent correlations determined for each multipath delay into a search statistic for that multipath delay.

38. A searcher according to claim 37 further comprising:

25 a buffer adapted to, for each correlation period, if the correlation period is earlier by a delay period than the corresponding search task period, buffer the CDMA signal received during the correlation period at least as long as the delay period.

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39. A searcher according to claim 38 further adapted to search for known codes in CDMA signals which each have a respective pilot channel having pilot channel slots and power control slots defined with reference to a respective mobile unit time, the respective mobile unit time being system time delayed by a round trip delay to a respective mobile unit, the searcher further comprising, for each search process:

a timing circuit adapted to identify where power control slots are expected to occur in the received signal;

wherein the scheduler is adapted to select the search task periods corresponding with the correlation periods such that the search task periods do not overlap partially with any of the power control slots, and to set the correlation periods to equal the search task periods.

40. A searcher according to claim 38 further adapted to search for known codes in CDMA signals which each have a respective pilot channel having pilot channel slots and power control slots defined with reference to a respective mobile unit time, the respective mobile unit time being system time delayed by a round trip delay to a respective mobile unit, the searcher further comprising, for each search process:

a timing circuit adapted to identify where power control slots are expected to occur in the received signal;

wherein the scheduler is adapted to, for each search task period of the plurality of search task periods for each search process:

if the search task period does not overlap partially with any power control slot, set the corresponding correlation period to equal the search task period;

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if the search task period overlaps with an end portion of a power control slot, set the corresponding correlation period to equal a period during which the power control slot is received; and

- 5           if the search task period overlaps with a start portion of power control slot, setting the corresponding correlation period to equal a period preceding a period during which this power control slot is received.

41.           A searcher according to claim 38 further adapted to  
10 search for known codes in CDMA signals which each have a respective pilot channel having pilot channel slots and power control slots defined with reference to a respective mobile unit time, the respective mobile unit time being system time delayed by a round trip delay to a respective mobile unit, the  
15 searcher further comprising, for each search process:

a timing circuit adapted to identify where power control slots are expected to occur in the received signal;

- wherein the scheduler is adapted to select the search task periods corresponding with the correlation periods such  
20 that the search task periods do not overlap with an end portion of any power control slot;

if the search task period does not overlap partially with any power control slot, set the corresponding correlation period to equal the search task period;

- 25           if the search task period does overlaps with a start portion of any power control slot, set the corresponding correlation period to equal a period preceding the start of the power control slot.

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